

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of)
Michael V. Glazov et al) Examiner Cam N. Nguyen
Serial No. 09/825,473) Group Art Unit 1754
Confirmation No. 2114)
Filed April 3, 2001) Alcoa Docket 99-2051
For Thermally Stable Alumina Particulates)

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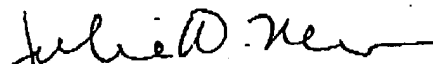
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Respectfully submitted,



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Michael V. Glazov et al.

U.S. Serial No. 09/825,473

Filed April 3, 2001

Confirmation No. 2114

"Thermally Stable Alumina Particulates"

Attorney Docket: 99-2051

1 pg. Transmittal Letter

11 pg. Appeal Brief

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APPEAL BRIEF

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Sir:

This Appeal Brief is in support of the Notice of Appeal filed April 3, 2003 in the above-identified patent application. The Notice of Appeal appeals the final rejection of claims 1-13.

The headings used hereinafter and the subject matter set forth under each heading are in accordance with 37 C.F.R. §1.192(c).

I. REAL PARTY IN INTEREST

Michael V. Glazov, John W. Novak, Jr., and Alexey Vertegel are the only inventors of the invention described and claimed in the above-identified application and each has assigned all rights, title and interest in the invention of the application to Alcoa Inc. Alcoa Inc. is the real party in interest in this Appeal.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to the Appellants or the Appellants' representative which will directly affect, or be directly affected by, or have a bearing on the Board's decision in this pending Appeal.

III. STATUS OF CLAIMS

Claims 1-13 are rejected under 35 U.S.C. § 103(a) for obviousness over U.S. Patent No. 5,155,085 to Hamano et al. taken together with U.S. Patent No. 3,853,789 to Warthen et al. and in combination with U.S. Patent No. 5,573,582 to Inui et al.

Claims 1-13 are pending and are appealed. Claims 1-13 are reproduced in Appendix A hereto.

IV. STATUS OF AMENDMENTS

No amendment has been filed following the final Office Action of December 18, 2002.

V. SUMMARY OF THE INVENTION

The invention, as set forth in appealed claims 1-13, is a method of preparing lanthanum-stabilized transitional alumina with high thermal stability by treating a solution of aluminum (with addition of a lanthanide series element such as La) with an anion-exchanger to produce hydroxides of aluminum and the lanthanide series element, such as $\text{Al}(\text{OH})_3$ and $\text{La}(\text{OH})_3$. The resulting composition is freeze dried, yielding a powder that is subsequently dehydrated to produce particulates of La-stabilized alumina.

VI. ISSUE

The issue presented by this Appeal is whether claims 1-13 are obvious over U.S. Patent No. 5,155,085 to Hamano et al. taken together with U.S. Patent No. 3,853,789 to Warthen et al. in combination with U.S. Patent No. 5,573,582 to Inui et al.

VII. GROUPING OF CLAIMS

Claims 1-13 do not stand or fall together. The claims are grouped as follows.

GROUP I: Claims 1-10, 12 and 13

GROUP II: Claim 11

The rejection of these claims is addressed in the arguments set forth below.

VIII. ARGUMENT

Claims 1-13 stand rejected under 35 U.S.C. §103(a) for obviousness over U.S. Patent No. 5,155,085 to Hamano et al. (hereinafter "Hamano") in combination with each of U.S. Patent No. 3,853,789 to Warthen et al. (hereinafter "Warthen") and U.S. Patent No. 5,573,582 to Inui et al. (hereinafter "Inui"). Appellants urge reversal of this rejection for the following reasons.

The present invention is directed to a method of preparing lanthanum-stabilized transitional alumina (e.g. La-stabilized γ -alumina) with high thermal stability by treating a solution of aluminum (with addition of a lanthanide series element such as La) with an anion-exchanger to produce hydroxides of aluminum and the lanthanide series element, such as $\text{Al}(\text{OH})_3$ and $\text{La}(\text{OH})_3$. The resulting composition is freeze dried, yielding a powder that is subsequently dehydrated to produce particulates of La-stabilized γ -alumina. Claim 1 requires the use of lanthanum, and claim 6 requires the use of a lanthanide series element. The freeze-drying step is particularly important for maintaining the specific surface area of the aluminum in contrast to thermal drying techniques, which are detrimental to the alumina. While techniques relating to use of anion-exchangers and freeze-drying have been described in the prior art, their combined use as in the present invention has not been taught or suggested. The combination of these features of the claimed invention yield complete stabilization of γ -alumina (as evidenced by standard industry test of 3 hours hold at 1200°C) at very low concentrations

of La (0.1 to 0.3 molar % per claim 11). Lanthanum is a very costly component; hence opportunities to reduce the level of its use are desirable.

GROUP I: Claims 1-10, 12 and 13

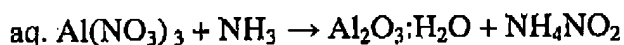
Hamano discloses a process for producing transition alumina (primarily γ -alumina) according to the following steps:

- (1) producing an aqueous solution of a mixture of aluminum sulfate and a lanthanum compound;
- (2) heating the mixture to drive off the water by one of an oven, oilbath, dry spray, flow drying, kneader, vacuum drying, ribbon dryer and paddle dryer; and
- (3) thermally decomposing the dried mixture at 800-1500°C for 0.1 second to 100 hours.

As noted in the Final Office Action, Hamano fails to teach at least steps (b) and (c) of claims 1 and 6. In both claims, step (b) requires treatment of a solution of an aluminum salt and a lanthanum compound with an inorganic hydroxyl group anion-exchanger to produce a hydroxide composition (aluminum hydroxide with a lanthanum hydroxide). Both claims also require in step (c) that the hydroxide composition is freeze-dried.

Warthen is relied upon to account for the deficient teachings in Hamano of the claimed step (b). The Final Office Action states that it would have been obvious to treat the solution of step (1) of Hamano with an alkaline reagent to produce a precipitate of aluminum hydroxide and lanthanum hydroxide at pH 6-11 because Warthen supposedly teaches to do so to obtain alumina with high mechanical strength and attrition resistance in the passage at col. 2, ll. 18-36. That portion of Warthen instructs precipitation of a hydrous alumina gel by one of two processes: alkali metal aluminate salt solution added to an acid or an alkaline reagent added to an acid aluminum salt solution. The Final Office Action equates the latter process of precipitating a hydrous alumina gel from an acid aluminum salt solution and alkaline reagent with the claimed step (b) of

treating the aluminum/lanthanum solution with an hydroxyl group anion exchanger. However, Warthen actually describes a different process by stating that the latter precipitation process may involve an acid aluminum salt solution (aluminum nitrate, aluminum chloride or aluminum sulfate) treated with ammonia. An example of such a process is as follows:



That process does not involve treatment of a salt solution with hydroxyl group anion exchanger. Moreover, there is no description of an intermediate hydroxide product (an aluminum hydroxide) as required in the claimed invention. In the absence of some teaching to even produce a hydroxide, there can be no motivation to use a hydroxide anion-exchanger. Hence, Warthen fails to suggest to one skilled in the art to modify the Hamano process by treating an aluminum/lanthanum solution with hydroxyl group anion exchanger.

Inui is relied upon to account for the deficient teachings in Hamano of the claimed step (c) of freeze drying the hydroxide solution. Inui describes thermal drying of aluminum hydroxide. At col. 7, ll. 20-49, Inui states:

Said hydroxide slurry prepared by the process of the present invention can be separated into solid and liquid by the treatment such as evaporation, drying and filtration.

As the solid-liquid separation, the method using a pneumatic conveying dryer (in this specification it is referred to as "said pneumatic conveying drying method") and the method comprising heating said hydroxide slurry to or above the boiling temperature of the liquid at atmospheric pressure and spraying said heated hydroxide slurry with pressure from a nozzle using flash dryer (in this specification, it is referred to as "said flash drying method") are preferred as a particularly suitable embodiment, since said hydroxide can be effectively isolated without agglomeration.

Dryers are generally classified into 8 kinds, as shown below, based on their mechanism:

1. material standing-type dryer,
2. material transferring-type dryer,
3. material stirring-type dryer,
4. hot-air transferring-type dryer,
5. cylindrical dryer,
6. infrared rays dryer,
7. freeze dryer, and
8. high-frequency dryer,

(reference: "Kagaku Kogaku Binran" Fifth Edition, p. 683, Published by Maruzen).

The pneumatic conveying dryer is included in the hot-air transferring-type dryer and the flash dryer does not fall under the conventional classification and utilizes flash evaporation.

That passage lists freeze drying as one of eight classes of drying techniques, but Inui only considers pneumatic conveying drying (characterized therein as a type of hot-air transferring drying) and flash drying as two suitable techniques of the eight potential choices. There is no motivation provided for substituting some other drying technique (i.e. freeze-drying) for the only two techniques described as useful in solid-liquid separation of an aluminum hydroxide slurry. The Final Office Action argues that Inui discloses freeze-drying as a suitable technique "for performing a similar process". However, Inui only states that freeze-drying is one of eight drying techniques – NOT that it is an option for drying an aluminum hydroxide slurry. Inui does not state that freeze drying is a viable alternative to the two techniques specifically disclosed. A simple list of known drying techniques (with two being singled out as suitable for drying aluminum hydroxide slurry) does not rise to the level of actually suggesting that one of those techniques not singled out should be used as in the claimed invention.

For the foregoing reasons, the subject matter of claims 1-10, 12 and 13 is nonobvious over the combined teachings of Hamano, Warthen, and Inui.

GROUP II: Claim 11

Claim 11 ultimately depends from claim 6 and requires that the concentration of lanthanum oxide in the γ -alumina is about 0.1 to about 0.3 mol%. Claim 11 defines over the cited references for the same reasons as claims 1-10, 12 and 13. In addition, the Final Office Action asserts that it would be obvious to optimize the lanthanum concentration in order to obtain a more effective alumina material.

However, optimizing at such a low level of lanthanum is actually taught away from by Hamano. Hamano states that low levels of La (e.g. 0.3 mol% or less) are problematic at col. 4, ll.54-58:

If the amount of lanthanum to be added is lower than 1 part by weight based on 100 parts by weight alumina [which corresponds to about 0.3 molar % La], an insufficient effect to inhibit a reduction in the specific surface area owing to the use at high temperatures will be obtained.

Hamano directly contradicts the assertion that low level optimization would be obvious since Hamano teaches that low levels of La would be detrimental to the alumina, namely by reducing the specific surface area of the alumina.

The cited references do not in combination provide motivation to use a hydroxyl anion-exchanger in producing an intermediate aluminum hydroxide, in conjunction with subsequent freeze-drying of the La-doped aluminum hydroxide. The features of claimed steps (b) and (c) uniquely provide for the opportunity to use extremely low concentrations of La (0.1-0.3 mol %) to achieve complete thermal stabilization of γ -alumina, as evidenced by the x-ray diffraction patterns of γ -alumina completely stabilized with 0.1 and 0.3 mol % La in Figs. 3 and 4 of the present application and to make the stabilized alumina product very inexpensively as compared to the prior art. Hence, claim 11 is believed to further define over the prior art of record.

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GROUP 1700**IX. CONCLUSION**

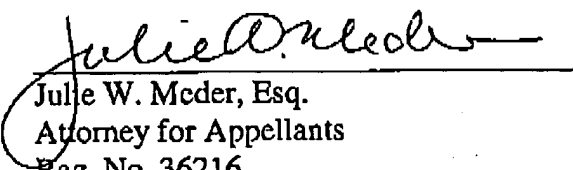
The matter of claims 1-13 is not obvious in view of the applied prior art for the reasons described above. Therefore, the Examiner's rejection of claims 1-13 under 35 U.S.C. § 103(a) should be reversed.

Reversal of the Final Rejection of claims 1-13 is respectfully requested for the reasons set forth herein.

Respectfully submitted,

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